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Of the emissary veins which, passing through the skull, connect the venous circulation within the cranium with the venous circulation of the external tissues, eight are known to exist. The most important of these are the emissaria mastoidea, emissaria condyloidea, emissaria parietales, and the emissaria occipitales, and by far the largest and most important of all are the emissaria mastoidea, which emerge from the skull just behind the mastoid processes, and furnish a direct venous connection of considerable size between the lateral sinuses within the skull and the occipital veins of the surface. Of the other emissaries, the emissarium condyloideum passes through the condyloid canal and connects the plexus vertebralis cervicalis with the lower end of the lateral sinus; the emissarium parietale, through the foramen parietale, connecting the veins of the scalp with the superior sagittal sinus; the emissarium occipitale, through a fine opening in the occipital protuberance, connecting the occipital veins with the sinus near the torcular Herophili. While most of these emissaries are small, and somewhat variable both in size and position, those of the mastoid are large and very constant.

In the three following cases, the only ones which I have ever met with, we had, in my opinion, to deal with a phlebitis of these emissaria mastoidea, in all probability due to an extension of inflammation from the lateral sinuses with which, as has been said, they are in direct connection. In all of the cases the prominent and characteristic symptom was the peculiar induration of the tissues of the neck, such as characterizes a cellulitis dependent upon phlebitis, and one of the best examples of which is seen in phlegmasia alba dolens.

The close relation of the lateral sinuses with the mastoid cells is well known; they are separated from the cells merely by the thin, inner, osseous wall of the cells, which is perforated usually by very numerous foramina filled with connective tissue, and possibly, in some cases, by minute blood-vessels. That these sinuses become involved in inflammation, which extends from the mastoid cells and tympanum, has been proven frequently by dissection, and phlebitis and thrombosis of the lateral sinuses have been found not only with extensive caries of the mastoid, but also with simple inflammation of the lining of the cells, the extension of the inflammation being traced, in these latter cases, to the connective tissue filling the minute foramina.

Case I.—T. M., clerk, aged twenty-two years, was first seen in the out-patient department of the City Hospital on May 27, 1870. He was then suffering from a purulent inflammation of the right tympanum of some weeks' duration; the membrana tympani showed a small perforation, the mastoid cells were inflamed, and a small mastoid abscess had ruptured externally of its own accord a few days before. No caries could be discovered with the probe.

After receiving advice, he was ordered to report again in two days, but was not seen again till June 22d, when he returned and said that he had been confined to the house for four weeks with severe pain in the head and right ear. He was very much emaciated, and complained of continuous, very severe pain in the right ear and over the right side of the head. The discharge from the meatus continued profuse; the membrana tympani was in the same condition as when first seen, and air could be easily forced through the perforation by Valsalva's inflation. The rupture of the mastoid abscess had healed, and at its site was a red, fluctuating and painful swelling of the size of a hen's egg. He was immediately taken into the hospital, and, under ether, the late Dr. Thaxter made an incision, two inches long, into the abscess and through the periosteum, evacuating a quantity of laudable pus; the bone was not softened or carious. From this time I saw him occasionally with Dr. Thaxter. Frequent douchings of the meatus with warm water and poultices to the wound were ordered.

June 23d.—The pain in the ear and head was very much less. Pulse 76; appetite fair.

June 27th.—The discharge from the meatus was very much diminished. There was, however, increased pain and tenderness over the mastoid, and a slight, hard induration of the tissues downward and backward from the seat of incision. The wound was healing.

July 1st.—The induration from the mastoid had extended down the neck

and towards the spinal column; it was hard, without redness, and on palpation clearly defined edges could be felt. The general condition was, however, good; the pulse was normal, the appetite better, and the wound was healing well.

July 6th.—The induration involved nearly the whole of the right side of the neck, from the spinal column to the sterno-mastoid muscle. He also now complained of periodical pain and tenderness over the occipital protuberance, the pain coming on about six o'clock P.M., and continuing for some hours, and then ceasing entirely. Pulse was 94. Quinine, in two grain doses, was ordered every two hours through the afternoon.

July 8th.—There was less pain and tenderness over the occiput. The induration of the neck had extended beyond the median line behind towards the other side; it was red and sensitive, but without fluctuation. There was some œdema of the eyelids, but the sight was unaffected. Pulse 84; urine normal; appetite and strength good, the latter much better than on entrance.

July 14th.—The anterior portion of the induration of the neck had now become a painful, fluctuating swelling, which produced difficulty in swallowing. The pain in the occiput still continued. Pulse 100. Under ether the fluctuating swelling was incised, by Dr. Thaxter, below the mastoid, and a small amount of pus evacuated; another incision was made over the mastoid, and a seton passed through the two openings. Pus was found to have burrowed quite extensively in the tissues of the neck. The operation relieved the pain in the neck entirely; the occipital pain continued, and required sulphate of morphia, gr. $\frac{1}{8}$, subcutaneously. The pulse varied from 84 to 94, and the general condition became rather worse, till

July 29th.—The pain in the occiput became very much less; he was able to sleep without opiates, and could walk about the ward. The induration of the neck continued; the wounds had ceased to suppurate freely, and the seton was removed; the œdema of the eyelids had disappeared.

August 2d.—The occipital pain again returned.

August 6th.—The pain was referred to the whole head. The condition of the ear itself had improved; the discharge was slight; the mastoid had healed without any caries being discovered, and there was no pain in the ear.

August 14th.—The pain in the head required morphine, gr. $\frac{1}{8}$, and atropine, gr. $\frac{1}{30}$, subcutaneously. He began to complain of a very tender spot over the occipital protuberance, and vomited after each meal.

August 23d.—Morphine, gr. $\frac{1}{8}$, was now required to relieve the pain. Over the occipital protuberance a small tumor, of the size of a pea, had formed; was incised, and a minute quantity of pus evacuated.

August 27th.—The pain in the head and the vomiting continued. Pulse 80.

September 4th.—The pain in the head had become intense. At two o'clock P.M. he was found in a semi-comatose condition, with sluggish and contracted

pupils; pulse 80, and respiration 10. This was followed by frequent vomiting and profound coma, and in the evening general tonic convulsions set in, lasting some ten minutes, and in these he died. No autopsy could be obtained.

Case II.—Lizzie H., aged seventeen, a domestic, entered the Massachusetts General Hospital March 12, 1875. Five weeks before, after exposure to cold, there was pain in the left ear, followed by discharge for some days. Since then there has been gradually increasing pain, tenderness and induration in the mastoid region and neck on the left side, but no pain or discharge in the ear.

March 16th.—I saw her in consultation with Dr. R. M. Hodges. She was about the ward, and the general condition was good. Examination of the left ear showed the membrana tympani very much sunken, nearly resting upon the promontory, and perhaps a little thickened; it was entirely free from redness and swelling. The hearing for the watch was $\frac{5}{72}$. Externally was a hard induration, beginning over the mastoid, and extending down the neck for some three inches and backward nearly to the median line; it was without redness or œdema, but was quite sensitive on pressure. Poultices, opiates p. r. n.

March 21st.—The pain in the induration has been increasing in severity, otherwise no change. Under ether Dr. Hodges incised the periosteum of the mastoid; no pus was found. The mastoid cells were then opened by a trephine; the bone was perfectly healthy, and the mucous lining of the cells was entirely free from swelling, redness, or secretion.

March 26th.—There is much less pain since the operation and the induration over the mastoid has diminished; that of the neck remains the same.

March 29th.—There is severe pain along the anterior border of the sterno-mastoid muscle, with marked œdema and great tenderness on pressure at this point; also decided erysipelas of left side of face. Quiniæ sulphas, gr. ij. t. d.

March 31st.—The erysipelas is better. General condition worse; appetite failing; pulse 98, temperature 100.

April 2d.—Neck still very painful and tender. The erysipelatous blush has disappeared. The back of the neck, just below the margin of the hair, is extremely sensitive to the touch. Now keeps in bed, having previously preferred to be about.

April 3d.—Some two inches back of the mastoid there is distinct fluctuation, and, under ether, Dr. Hodges incised the tissues and evacuated a large amount of pus, which had burrowed quite deeply in the neck; an artery of considerable size was cut and required ligation.

April 4th.—Complains of dyspnœa and weakness; pulse 118, temperature 99. Stimulants.

April 5th.—Much dyspnœa last evening, which was relieved by morphiæ sulphas, gr. $\frac{1}{3}$, subcutaneously. This morning unconscious; breathing better; pupils not contracted; pulse 120, and very weak. Two purpuric spots, one

over right eye and the other on the right forehead. The right auricle is quite purple. During the day the pulse became weaker, the right auricle became still darker in color, and at eleven P.M. she died, without new symptoms. Autopsy could not be obtained.

CASE III.—Esther D., aged twenty-one, strong and healthy, had had a continuous otorrhœa on the right side since early childhood, till within a year, when she says there has only been occasional slight discharge, but no pain; the ear was somewhat deaf.

About one week before I saw her she took a severe cold, and complained of pain in the right ear and on left side of head; with this there was some dulness at the base of one lung. The constitutional symptoms were slight, the dulness of the lung cleared up, leaving only a slight bronchitis; the pain in the ear and head were never very severe. There was no discharge from the ear externally, and she seemed to be going on well till February 18th, when she complained of severe pain behind the right mastoid, which was soon followed by a hard induration of the tissues below the seat of pain; at the same time there was a decided rise in the pulse, with hot skin.

The next day, February 19, 1879, I saw her in consultation with Dr. J. G. Blake. There was more marked constitutional disturbance than on the previous day, and there had been very slight delirium. The chief complaint was of the pain at the seat of induration. The pulse was 120, skin hot. Examination of the ear, the patient being able to sit up in a chair, showed the meatus filled with a thin, muco-purulent discharge; the drum-membrane and ossicles were gone, and the tympanic mucous membrane was somewhat thickened, swollen, and inflamed. Over the mastoid was no tenderness, even on deep pressure, and the tissues there were free from œdema or redness. Below and behind the mastoid was a hard induration of the tissues, extending down the neck for some two inches in length and the same in breadth, with irregular, sharply-defined edges. The whole induration was very sensitive, but most so at the point close to the base of the skull. There was no redness of the skin, no distention of the veins, and no tenderness along the jugular vein. Examination of the lungs showed only slight bronchitis; the heart sounds were normal. She was ordered nourishment, chiefly milk, quinine, an opiate at night, and six leeches over the induration.

February 20th.—I saw her again with Dr. Blake; there was more decided delirium, a pulse of 132 and weaker, and a temperature of 104.1°. The induration of neck was more extended, and there was some swelling above the normal plane of the tissues; the skin was slightly red; no fluctuation. Two well-marked purpuric spots, one inch by one-half an inch, had appeared on the left side, one just below the jaw and one over the clavicle; no others were found on the back or on one leg, the only parts examined. No *tache cérébrale*.

From this time she gradually became unconscious, and without any new symptoms died within twelve hours. No autopsy.

All three of these cases, it will be noticed, had two characteristics in common, the induration of the neck, and, finally, fatal symptoms. The induration in all was peculiar and readily distinguishable from any of the more common forms of inflammation in that region, such as mastoid abscess, inflamed glands or furuncle. The tissues, without being swollen above the normal plane, were at first extremely hard, feeling like a board; the edges of the induration were felt distinctly; the color of the skin was normal. As the disease progressed the tendency was for the induration to extend toward the posterior aspect of the neck and the occiput rather than toward the face. In two of the cases during the later stages of the disease suppuration occurred in parts of the indurated tissue, and on incision the tissues were found to be infiltrated with pus. In two of the cases purpuric spots appeared on the face and upper part of the chest during the last twenty-four hours of life.

In only one of the cases was the induration seen early enough to make out the exact spot from which it started; in the third case it was certain that it began directly behind the mastoid, just at the base of the skull, and from here was steadily extending downward and backward till the time of the patient's death.

All three cases were either immediately preceded or else accompanied by a purulent inflammation of the tympanum of the affected side; in the first case the tympanic inflammation was acute and followed by inflammation of the mastoid cells and external suppurative periostitis; in the second case there had been purulent tympanic inflammation a short time before without, so far as could be determined from the history, any extension to the mastoid cells, certainly without any external periostitis; in the third case there was chronic purulent inflammation of the tympanum of many years' standing, but no external periostitis or symptoms referable to the mastoid, although, from the long continuance of the tympanic disease, it was probable that there was also more or less inflammation of a chronic character in the mastoid cells.

In all of the cases when first seen the symptoms pointed only to

the local trouble in the ear and neck; in the first case, to be sure, there was great pain in both ear and head, but not more than is common with a large mastoid abscess, such as existed when this patient returned to the hospital, and both these pains were relieved by the evacuation of the mastoid abscess; in the other two cases the symptoms were merely local pain in the induration of the neck or in the ear. In none of the three did the pulse, temperature, or appetite show any marked disturbance of the general system, nor was there, at first, any reason to anticipate, from the appearance of the patients, a fatal termination to the disease.

The succession of the symptoms in the several cases was as follows: in the first, acute inflammation of the tympanum and mastoid with external mastoid abscess, induration of the neck below and behind the mastoid, periodical pain in the occipital region, œdema of the eyelids, suppuration of the induration, general pain in the head, suppuration over the occiput, vomiting, coma, convulsions, and death seventy days after the appearance of the induration; in the second case there was acute suppuration of the tympanum which had healed, induration of the neck, pain, tenderness and œdema along the course of the jugular vein, facial erysipelas of the affected side only, suppuration in the indurated tissues which were incised, dyspnœa, coma, purpura, and death thirty-six days after the appearance of the induration; in the third case there was chronic suppuration of the tympanum, slight pneumonia, induration of the neck, with delirium, fever, purpura, and death two days after the appearance of the induration.

The treatment adopted in these cases, although it had no influence on the course of the disease, is of interest in assisting us to arrive at the origin of the trouble. In the first, although a large mastoid abscess had formed externally and had existed for some weeks, the operation showed that the external wall of the mastoid cells was not carious or softened, and the subsequent suppuration which occurred below and behind the mastoid was a suppuration in the indurated tissue of the neck, the mastoid abscess having in the meantime healed; in this patient the pain was referred chiefly to the occipital region, and was of the very intense character only seen with disease of the brain; after it had continued for some time

a small spot of suppuration occurred beneath the periosteum over the occipital protuberance, just at the spot where the occipital emissary vein emerges from the skull. In the second case, although the symptoms of mastoid inflammation were wanting, it was thought best to trephine the mastoid cells to avoid the possibility of any retention of the products of inflammation there; the operation showed that the external wall was perfectly normal, and no inflammation existed within the cells; the induration of the neck had existed for two or three weeks before the operation, and was in no way influenced by it, except that the pain, previously referred to the neck, seemed to be somewhat relieved for a time, either due to the revulsive action of the operation or to the free bleeding. In the third case free leeching only was resorted to, but without influence on the disease; remembering the two previous cases, and that the result of the operations in both of those showed that the disease was independent of any condition which could be relieved by surgical procedure, I was unwilling to advise any operation.

In regard to the final fatal symptoms: in the first case there can be no doubt that death was due to disease of the brain, coma setting in and being followed by convulsions of considerable duration, during which death occurred; in the second case, the first alarming symptom was violent dyspnœa followed by unconsciousness, purpuric spots on the face, and death, very probably caused by septicæmia or emboli, or both; in the third case delirium and fever were rapidly followed by purpura and death, the symptoms, so far as they were developed, pointing to the brain.

The symptoms of thrombosis and phlebitis of the brain sinuses are by no means clearly defined, or rather they are so multiform and so often complicated with other diseases that the diagnosis is by no means simple. Wreden, from an analysis of one hundred and fifty-one cases,[1] has called attention to the anatomical relations of the circulation of the external skin which is connected with the sinuses as a great aid to the diagnosis. When the cavernous sinus is obstructed, passive congestive œdema occurs in the parts drained

[1] St. Petersburger Medizinische Zeitschrift, Vol. XVII., and Boston Med. and Surg. Journal, May 18, 1876. Report on Otology.

by the ophthalmic vein; this congestion showing itself by œdematous swelling of the nostril, forehead, and eyelid, by hyperæmia of the retina and swelling of the nasal mucous membrane, with bloody discharge. Thrombosis of the superior longitudinal sinus is characterized by repeated violent hemorrhages from the nose, and by epileptiform convulsions, which Wreden refers to capillary hemorrhages in the cortical substance of the posterior cerebral lobes, produced by obstruction to the venous circulation of the surface of the brain. Thrombosis and phlebitis of the lateral sinus is shown by œdematous swelling of the soft parts in and about the external ear which has, he says, exactly the character of phlegmasia alba dolens; there is frequently also constant dizziness and a staggering gait. As the disease progresses, the obstruction extends down the internal jugular vein, and the phlegmonous inflammation extends downward along the course of that vein toward the clavicle, the greatest swelling and tenderness being along the vein. Congestion of the facial vein and œdema of the face follow from the obstruction in the jugular vein, but a collateral circulation is soon established through the branches to the external jugular, and this œdema is soon relieved unless the facial vein itself becomes closed, when there will be very great and continuous œdema of the face, and if the phlebitis extends to the smaller veins there will be a distinct erysipelas of the cheek and forehead. These symptoms of disease of the sinuses have now been confirmed by a very considerable number of cases by other authors, recently by Rammel,[1] Kolb,[2] Taylor,[3] although they are by no means invariably present, or they may be so masked or transitory as to escape observation.[4]

These characteristics of thrombosis of the lateral sinuses as given by Wreden, although not present in the very marked degree that they have attained in many cases, were not altogether absent in the three cases here reported. In the first case there was, for some days, decided œdema of the eyelids, but the whole history shows that the disease tended to extend backward rather than forward,

[1] Der Feldartz, No. 25, 1876.

[2] Berliner klinische Wochenschrift, No. 46, 1876.

[3] Med. Times and Gazette, Apr. 28, 1877.

[4] Moos: Archives of Ophthalmology and Otology.

as shown by the pain in the occiput, and suppuration over the occipital protuberance; this severe pain in the occiput was a prominent symptom in the third of Moos' cases where the autopsy proved the death to be due to meningitis from thrombosis and phlebitis of the lateral sinus, caused by chronic inflammation of the mastoid cells without caries. In the second of my cases there was pain, œdema, and tenderness along the course of the jugular vein, followed by transitory erysipelas of the face, as described by Wreden. In the third case, the patient evidently succumbed to the intensity of the disease before there was time for any of the symptoms to become pronounced. The absence of marked symptoms in the general system does not at all militate against the existence of thrombosis of the sinuses, for the same thing is found in many of the cases supported by autopsy; in two of my cases the strength and appetite were unimpaired, and the pulse and temperature normal for a considerable time after the onset of the disease. In fact, in the cases of established thrombosis, such is the rule, until the clot has extended to other veins, or emboli enter the general circulation, or phlebitis sets in.

The œdema around the ear spoken of by Wreden with disease of the lateral sinuses, and described by Moos, in the fourth one of his cases, as extending from the temple to the tragus, must be referred to obstruction of the posterior facial vein, which joins the common facial near the angle of the jaw. Obstruction and inflammation of the mastoid emissary veins is mentioned incidentally in some of the cases which have been reported, but I am not aware of any in which the induration and inflammation of the posterior aspect of the neck was the early and prominent symptom as in the three cases here recorded.

It might be a question in these cases whether the disease began external to or within the skull; in the first, where there was a large external mastoid abscess, the external origin is certainly possible from the vein becoming involved in the previous inflammation. In the second case, there was, however, no preceding external inflammation, and the induration of the neck was soon followed by pain and tenderness along the jugular vein, and by facial erysipelas, symptoms which could only be referred to inflammation of

vessels directly connected with the sinuses, and not connected with the parts involved in the induration. In the third case, there was no previous external inflammation, and induration began exactly at the spot where the emissary vein emerges.

A most striking fact is noticed in examining the reported cases of thrombosis and phlebitis of the lateral sinuses. In many cases the disease is excited by simple, uncomplicated inflammation of the mastoid cells, which extends, by continuity, along the connective tissue filling the minute foramina of the inner osseous wall of the cells; in others the whole mastoid is in a state of caries or necrosis, and the sinus embedded in suppurating granulation-tissue, and yet neither thrombosis nor phlebitis exists.

A short analysis of the symptoms in several cases of thrombosis of the lateral sinus, which have been recently reported, may be of interest in this connection.

Rammel [1] reports briefly one of chronic tympanic inflammation on the right, where the patient entered the hospital on October 21st, with typhoidal symptoms, a temperature of 101.3°, and a pulse of 120. On October 23d there was pain in the head and nape of the neck, œdema and tenderness over the mastoid, and lobular pneumonia; then followed right facial paralysis, œdema of right upper eyelid, chemosis, exophthalmos, dilated pupils, somnolence, swollen spleen, œdema of the left lid and right temple. The pulse was then about 60. November 3d, there was chemosis of both lids, mild delirium, anæsthesia of the right half of the face, swollen liver and spleen, diarrhœa and pneumonic infiltration of the right lung. November 6th, the œdema of the lids and mastoid, the facial paralysis and anæsthesia had disappeared. November 8th, there was pneumonia of the left lung, and gradual symptoms of gangrene of the lungs with death.

During the disease, the stiffness and pain at the back of the neck, the otorrhœa, deafness, and exophthalmos remained constant; the facial paralysis, œdema of mastoid and lids, difference in the pupils, the swelling of the liver and spleen, and the pneumonia varied several times. The autopsy showed caries of the tympanum, thrombosis of the right lateral sinus, phlebitis of the

[1] Feldarzt. No. 25, 1876.

jugular vein, and metastasis to the lungs. The thrombus extended from the right lateral sinus through the inferior petrosal to the cavernous sinus, thence through the circular to the left cavernous sinus, which was filled with disorganized clots and with pus.

A case reported by Kolb[1] is of great interest from the multiplicity and undoubted character of the symptoms, and especially from the fact that the patient recovered, at least for the time, and was discharged from the hospital. A girl, aged seventeen, had had occasional otorrhœa for several years, but the exact condition of the ear seems never to have been determined. On October 23, 1875, there began a bloody discharge from the right ear, which ceased after eight days; at the same time there was headache on the right side, sleeplessness, daily chills, œdematous inflammatory swelling of the skin over the right mastoid, with swelling of a vein at that spot; a similar swelling of the eyebrows and of both eyelids, exophthalmos of the right eye, photophobia, vomiting, delirium, constipation, general convulsions, hyperæsthesia, clonic spasms of the right arm and right leg, mistiness of vision, small hemorrhages in the skin of the rump, pain in the chest, dry cough, and hemorrhages from the right nostril. The pulse varied between 62 and 90; the temperature was normal throughout; all the symptoms disappeared between November 19th and 23d, but many of them returned, together with the coughing of blood, and again disappeared to return for the third time; by the 6th of January they had again disappeared, and there had been no recurrence one month later, when the patient left the hospital apparently well. Kolb calls special attention to the repeated improvement and relapse in this case.

A case reported by Taylor[2] is unusual, in that the final symptoms were decidedly those of meningitis, which the autopsy showed did not exist. There was chronic otorrhœa, followed by delirium, strabismus, diplopia, eye-disks blurred and redder than usual, with the retinal veins full and tortuous, sudden rise and fall in the temperature, some enlargement of the superficial veins of the face and

[1] Berliner klinische Wochenschrift, No. 46, 1876.

[2] Medical Times and Gazette, April 28, 1877.

chest, but no œdema anywhere. The autopsy showed thrombosis of the lateral sinus, thrombosis and phlebitis of the jugular vein, and metastatic abscesses in the lungs. The brain was normal. The cerebral symptoms in this case are referred by Taylor to disturbances in the cerebral circulation different in kind but like in effect to that which occurs in meningitis.

Moos[1] reports four cases: in the first there was acute inflammation of the right ear, pain in the right forehead and temple, slight chills, constipation, debility, somnolence, photophobia, and impaired vision, delirium, repeated severe chills, sudden rise and fall of temperature, consolidation of the lungs, stupor and death. No œdema anywhere. The autopsy showed thrombosis of the right lateral sinus and internal jugular vein; slight phlebitis of the emissary mastoid vein; metastatic deposits in the lungs. In the second case there was chronic otorrhœa on the right, of one year's duration; intense pain on the right side of the head, and death. The autopsy showed thrombosis of the sigmoid flexure of the right lateral sinus and lepto-meningitis. In both of these cases the extension of the inflammation from the ear to the sinus was traced to the connective tissue filling the foramina. In the third case there was chronic inflammation of the right tympanum, chills, pain in the occiput, vomiting, dyspnœa, opisthotonos and death. At the autopsy there was found to be phlebitis and thrombosis of the lateral sinus, and meningitis cerebralis. The mastoid cells were filled with a cholesteatomatous mass, and the inflammation had extended to the sinus along the connective tissue as in the previous cases. In the fourth case there was old caries of the petrous bone, pain in the ear, forehead, and occiput, fever, œdematous swelling extending from the temple to the tragus, diffuse headache, stupor, spasms of the upper extremities, and death. The autopsy showed phlebitis and thrombosis of the lateral and superior petrosal sinuses, with circumscribed basilar meningitis.

Burckhardt-Merian[2] reports one case in a child two years old, with extensive caries of the left petrous bone and external open-

[1] Archives of Ophthalmology and Otology, vol. vii., No. 4.

[2] Archiv für Ohrenheilkunde, vol. xiv., p. 178.

ings over the mastoid; there was vomiting, delirium, bloody discharge from the nostrils, spasms of the extremities, purulent inflammation of the nasal mucous membrane, sluggish pupils, a temperature of 102.2° and pulse from 132 to 144. These symptoms were followed by convulsions, sharp cries, violent tossing of the head, and death. The autopsy showed tubercular meningitis, caseous pneumonia, and pyo-pneumothorax; there was also thrombosis of the left lateral sinus, but the connection of this with the fatal diseases was not evident.